## REDUCTION OF A CENTURY OF TEMPERATURE OBSERVATIONS TOHOMOGENIETY.

By ERIC R. MILLER.

[Presented before the American Meteorological Society at Chicago, Dec. 29, 1920.]

[Author's abstract.]

A table of monthly mean temperatures from October, 1819, to date has been prepared for Madison, Wis. Of these, 59 years 8 months are derived from observations actually made at Madison. The period from October, 1819, to December, 1873, is covered by data from stations in Wisconsin and adjoining states at which observations were made by the Army Medical Corps, Smithsonian observers, and others.

The Madison data have been corrected to the mean of 24 hourly observations. The other data have in addition corrections for reduction to Madison. These corrections were obtained from recent observations.

The aggregate length of record from the 17 neighboring stations used is 283 years 10 months, and gives from one to nine estimates of the mean temperature for each month.

Comparison of these estimates with one another and with observations at Madison, when available show that single estimates may differ 5° or 6°, but that the mean of four or five estimates is within 2½° F.

The comparisons also show that the Smithsonian and Army thermometers were exposed to the sun at some stations. The influence of exposure nearer the ground than in Weather Bureau offices of the present day is also plainly evident. Only one case, of serious instrumental error was detected among the 18 stations considered. Many typographical errors in printed tables were found.

## THE INVESTIGATION OF GRAVITY AT SEA.

Students of both geodesy and meteorology will be interested in the note in *Nature* for February 3, 1921 (pp. 732–734), by Prof. W. G. Duffield, giving a brief résumé of the difficulties of determining the value of gravity at sea and the results of such efforts.

It is gratifying to note the statement at the close of the article to the effect that the causes of errors are engaging the attention of those who are contemplating a fresh attack upon the problem.

In this connection the writer wishes to repeat a suggestion he first made more than a year ago, that one of the engines employed in warfare may be made to serve an excellent purpose in the investigations of gravity at sea, namely, the submarine. It would seem that this boat, riding a short distance below the surface of the water, would furnish a very suitable station in midocean at which observations of gravity could be made with the greatest possible deliberation and entirely free from some of the sources of disturbance and errors that can not be avoided in the case of vessels riding on the surface.

The details by which observations could be obtained by means of the submarine and the possibilities of such investigations furnish a fruitful subject for study and development.—*C. F. Marvin.*

# NOTES, ABSTRACTS, AND REVIEWS.

## ELECTRIC-OSCILLATION ANEMOMETER.[1]

By E. ROTHE.

[Reprinted from *Science Abstracts*, Sect. A, November, 1920, §1376.]

In cloudy or foggy weather, when observations of the upper winds by pilot balloons are impossible, an electric contact anemometer may be raised by balloon or kite, but this necessitates a double wire with the consequent additional weight to lift. The author outlines a method of using only a single wire, the cable of the balloon or kite. The anemometer is made to act as an interrupter, putting into action, at each contact, an instrument which sets up electric oscillation in the wire. These are received at the surface by a "wireless" receiving set. The velocity of the wind is deducible in the ordinary way from the frequency of the contacts. Several anemometers may be attached to the cable at different heights, each instrument emitting waves of a different length, so that any particular one may be made to register by suitably tuning the receiver at the surface. Extension might be made to other meteorological elements, and a complete "observatory" could then be raised and made to record at the surface by a single wire.—*M. A. G.*

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## VARIATION OF THE INDICATIONS OF ROBINSON AND RICHARD ANEMOMETERS WITH THE INCLINATION OF THE WIND.[2]

By C. E. BRAZIER.

[Reprinted from *Science Abstracts*, 1920, §1041.]

Robinson and Richard anemometers have been exposed, in an aerodynamical laboratory, to wind currents of known velocity making various angles with the normal position in which the instrument is used, and some preliminary results are noted in this paper. The number of revolutions per second ($n$) in the normal position is found to be related to the wind velocity ($V$) by a relation of the form $V=A+Bn$ for the Robinson anemometer and $n=aV+bV^2+cV^3$ for the Richard. The term in $V^3$ may be omitted by reducing the size of the Richard instrument. If the instruments are inclined to their normal position at angles up to 30° it is found sufficient to modify the above relations, expressed in the form $n=\phi(V)$, simply by multiplying $\phi(V)$ by a factor. For an inclination of 30° the factors found are 1.1 for the Robinson anemometer and 0.8 for the Richard. The experiments show that, for a given wind velocity, the variation in the velocity of rotation is not a simple function of the inclination of the instrument to the normal position, and the effect of increasing the inclination up to 90° is shown by an example for each instrument. A description is added of the effect of exposing an element of a Robinson anemometer (2 cups only) in the normal position to a stream of air velocity 5 m./sec. Four positions of equilibrium are found, two stable and two unstable. Commencing with a position of stable equilibrium and increasing the velocity of the air, the system after oscillating finally rotates continuously in the ordinary sense.—*M. A. G.*

### DISCUSSION.

This note is important in that it indicates a method of determining true velocities from anemometers carried by kites or airplanes whose position may change more or less with reference to the wind, and from anemometers of the "windmill" type (such as Richard's) when they are oriented by vanes of different lengths.

[1] *Comptes Rendus*, May 17, 1920, 170:1197–1198.
[2] *Comptes Rendus*, Mar. 8, 1920, pp. 610–612.